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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/829,797	04/10/2001	Zhongning Liang	NL 000195	1904
24737	7590	09/23/2004	EXAMINER	
PHILIPS INTELLECTUAL PROPERTY & STANDARDS P.O. BOX 3001 BRIARCLIFF MANOR, NY 10510			LEWIS, MONICA	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 09/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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**Office Action Summary**

Application No.

09/829,797

Applicant(s)

LIANG ET AL.

Examiner

Monica Lewis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 June 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 and 12-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 12-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 April 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. This office action is in response to the amendment filed June 30, 2004.

#### *Response to Arguments*

2. Applicant's arguments with respect to claims 1-7 and 12-14 have been considered but are moot in view of the new ground(s) of rejection.

#### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 and 3-5 are rejected under 35 U.S.C. 103(a) as obvious over Ker et al. (U.S. Patent No. 6,633,087) in view of Lee et al. (U.S. Patent No. 6,465,337).

In regards to claim 1, Ker et al. ("Ker") discloses the following:

a) a bond pad disposed above a layered structure that increases structural integrity of the bond pad structure (For Example: See Column 3 Lines 39 and 40);

b) layered structure comprises a top and bottom metal layer (250 and 210) (For Example: See Figures 3 and 4);

c) a plurality of intermediate metal layers (240, 230 and 220) (For Example: See Figures 3 and 4);

d) at least one layer of dielectric material (212, 222, 232, 242 and 252) (For Example: See Figures 3 and 4); and

e) a plurality of equally spaced parallel via lines (214, 224, 234 and 244) that connect the top and bottom metal layers and partition the at least one dielectric area to form isolated areas filled with dielectric material (For Example: See Figures 3 and 4).

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In regards to claim 1, Ker fails to disclose the following:

a) the isolated areas filled with dielectric material have a surface to volume ratio such that an amount of elastic energy to be released when a crack is formed in the dielectric material is smaller than an amount of surface energy to be gained when the crack is formed.

However, Lee discloses insulators that are between .3um and 10um in width (For Example: See Column 5 Lines 52-61). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ker to include insulators with a width between .3um and 10um as disclosed in Lee because it aids in preventing cracking (For Example: See Column 5 Lines 52-61).

Note: In the specification Applicant states that “the volume to surface ratio of the dielectrics 4 in the direction parallel to the bond pad is sufficiently small to prevent crack formation...for example, when the dielectric thickness is 1 um, the width and length of the dielectric block should be smaller than 10um” (See Page 4 Lines 25-30). Although, Lee does not specifically disclose “elastic energy” or surface energy” there is disclosure that the width of the insulators is between .3um and 10 um which falls in the range disclosed by Applicant.

Additionally, since Ker and Lee are both from the same field of endeavor, the purpose disclosed by Lee would have been recognized in the pertinent art of Ker.

In regards to claim 3, Ker discloses the following:

a) a stack of layered structures is present (For Example: See Figures 3 and 4).

In regards to claim 4, Ker discloses the following:

a) the metal layer in each layered structure is a metal plate (For Example: See Figures 3 and 4).

In regards to claim 5, Ker discloses the following:

a) the top and bottom metal layers of the stack are metal plates and the intermediate metal layer or layers are parallel metal lines (For Example: See Figures 3 and 4).

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In regards to claim 13, Ker discloses the following:

a) the isolated areas of dielectric material have dimensions that are less than that of the bonding pad (For Example: See Figures 3 and 4).

8. Claims 2 and 7 are rejected under 35 U.S.C. 103(a) as obvious over Ker et al. (U.S. Patent No. 6,633,087) in view of Lee et al. (U.S. Patent No. 6,465,337) and Kida et al. (U.S. Patent No. 6,313,540).

In regards to claim 2, Ker fails to disclose the following:

a) the via lines are lines of tungsten.

However, Kida discloses tungsten via lines (For Example: See Column 4 Lines 37-39). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ker to include tungsten via lines as disclosed in Kida because it aids in providing an electrical connection (For Example: See Abstract).

Additionally, since Ker and Kida are both from the same field of endeavor, the purpose disclosed by Kida would have been recognized in the pertinent art of Ker.

In regards to claim 7, Ker fails to disclose the following:

a) the via lines are patterned in the form of a grid.

However, Kida discloses via lines patterned in the form of a grid (For Example: See Figures 7a-7h). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ker to include via lines patterned in the form of a grid as disclosed in Kida because it aids in minimizing breakage (For Example: See Column 5 Lines 23-42).

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Additionally, since Ker and Kida are both from the same field of endeavor, the purpose disclosed by Kida would have been recognized in the pertinent art of Ker.

9. Claim 6 is rejected under 35 U.S.C. 103(a) as obvious over Ker et al. (U.S. Patent No. 6,633,087) in view of Lee et al. (U.S. Patent No. 6,465,337) and Saran et al. (U.S. Publication No. 2002/0187634).

In regards to claim 6, Ker fails to disclose the following:

a) the metal lines are patterned in the form of a grid.

However, Saran discloses metal lines in the form of a grid (For Example: See Paragraph 5). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ker to include metal lines in the form of a grid as disclosed in Saran because it aids in serving as reinforcement for the dielectric layer (For Example: See Figure 5).

Additionally, since Ker and Saran are both from the same field of endeavor, the purpose disclosed by Saran would have been recognized in the pertinent art of Ker.

10. Claims 12 and 14 are rejected under 35 U.S.C. 103(a) as obvious over Ker et al. (U.S. Patent No. 6,633,087) in view of Lee et al. (U.S. Patent No. 6,465,337) and Haluska et al. (U.S. Patent No. 4,847,162).

In regards to claim 12, Ker fails to disclose the following:

a) the dielectric material is hydrogen silsequioxane.

However, Haluska et al. ("Haluska") discloses the use of hydrogen silsequioxane (For Example: See Abstract). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ker to include hydrogen

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silsequioxane as disclosed in Huluska because it aids in preventing cracks (For Example: See Column 1 Lines 5-20).

Additionally, since Ker and Huluska are both from the same field of endeavor, the purpose disclosed by Huluska would have been recognized in the pertinent art of Ker.

In regards to claim 14, Ker fails to disclose the following:

a) the isolated areas of dielectric material have dimensions that are chosen in dependence upon the composition of the dielectric material.

However, Haluska discloses that the material can be formed to have a thickness of up to 2 microns (For Example: See Column 5 Lines 27-40). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ker to include material that can be formed to have a thickness of up to 2 microns as disclosed in Huluska because it aids in preventing cracks (For Example: See Column 5 Lines 27-40).

Additionally, since Ker and Huluska are both from the same field of endeavor, the purpose disclosed by Huluska would have been recognized in the pertinent art of Ker.

### ***Conclusion***

11. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure: a) Skala et al. (U.S. Patent No. 6,020,647) discloses composite metallization.

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 571-272-1838.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML

September 10, 2004



**Mary Wilczewski**  
**Primary Examiner**